SEQUENCE LISTING

Schuetz, John <120> A Method of Identifying and/or Isolating Stem Cells <130> 1340-1-021CIP2 <140> 09/866,866 <141> 2001-05-29 <150> 09/584,586 <151> 2000-05-31 <150> PCT/US99/11825 <151> 1999-05-27 <150> 60/086,988 <151> 1998-05-28 <160> 27 <170> PatentIn version 3.0 <210> 1 <211> 3860 <212> DNA <213> Homo sapiens <400> 1

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Leu Asp Thr Glu Ser Glu Ala Val Val Gln Val Ala Leu Asp Lys Ala
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Arg Lys Gly Arg Thr Thr Ile Val Ile Ala His Arg Leu Ser Thr Val
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Arg Asn Ala Asp Val Ile Ala Gly Phe Asp Asp Gly Val Ile Val Glu
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Lys Gly Asn His Asp Glu Leu Met Lys Glu Lys Gly Ile Tyr Phe Lys
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Leu Val Thr Met Gln Thr Ala Gly Asn Glu Val Glu Leu Glu Asn Ala
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Ala Asp Glu Ser Lys Ser Glu Ile Asp Ala Leu Glu Met Ser Ser Asn
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Asp Ser Arg Ser Ser Leu Ile Arg Lys Arg Ser Thr Arg Arg Ser Val
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Arg Gly Ser Gln Ala Gln Asp Arg Lys Leu Ser Thr Lys Glu Ala Leu
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Asp Glu Ser Ile Pro Pro Val Ser Phe Trp Arg Ile Met Lys Leu Asn
690 695 700

Leu Thr Glu Trp Pro Tyr Phe Val Val Gly Val Phe Cys Ala Ile Ile
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Asn Gly Gly Leu Gln Pro Ala Phe Ala Ile Ile Phe Ser Lys Ile Ile
725 730 735

Gly Val Phe Thr Arg Ile Asp Asp Pro Glu Thr Lys Arg Gln Asn Ser
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Asn Leu Phe Ser Leu Leu Phe Leu Ala Leu Gly Ile Ile Ser Phe Ile
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Thr Phe Phe Leu Gln Gly Phe Thr Phe Gly Lys Ala Gly Glu Ile Leu
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Thr Lys Arg Leu Arg Tyr Met Val Phe Arg Ser Met Leu Arg Gln Asp
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Val Ser Trp Phe Asp Asp Pro Lys Asn Thr Thr Gly Ala Leu Thr Thr
                805                 810                 815

Arg Leu Ala Asn Asp Ala Ala Gln Val Lys Gly Ala Ile Gly Ser Arg
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Leu Ala Val Ile Thr Gln Asn Ile Ala Asn Leu Gly Thr Gly Ile Ile
        835                 840                 845

Ile Ser Phe Ile Tyr Gly Trp Gln Leu Thr Leu Leu Leu Leu Ala Ile
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Val Pro Ile Ile Ala Ile Ala Gly Val Val Glu Met Lys Met Leu Ser
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Gly Gln Ala Leu Lys Asp Lys Lys Glu Leu Glu Gly Ala Gly Lys Ile
                885                 890                 895

Ala Thr Glu Ala Ile Glu Asn Phe Arg Thr Val Val Ser Leu Thr Gln
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Glu Gln Lys Phe Glu His Met Tyr Ala Gln Ser Leu Gln Val Pro Tyr
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Arg Asn Ser Leu Arg Lys Ala His Ile Phe Gly Ile Thr Phe Ser Phe
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Thr Gln Ala Met Met Tyr Phe Ser Tyr Ala Gly Cys Phe Arg Phe Gly
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Ala Tyr Leu Val Ala His Lys Leu Met Ser Phe Glu Asp Val Leu Leu
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Ser Phe Ala Pro Asp Tyr Ala Lys  Ala Lys Ile Ser Ala  Ala His Ile
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Ile Met  Ile Ile Glu Lys Thr  Pro Leu Ile Asp Ser  Tyr Ser Thr
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Glu Gly  Leu Met Pro Asn Thr  Leu Glu Gly Asn Val  Thr Phe Gly
    1025                1030                1035

Glu Val  Val Phe Asn Tyr Pro  Thr Arg Pro Asp Ile  Pro Val Leu
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Gln Gly  Leu Ser Leu Glu Val  Lys Lys Gly Gln Thr  Leu Ala Leu
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Val Gly  Ser Ser Gly Cys Gly  Lys Ser Thr Val Val  Gln Leu Leu
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Glu Arg  Phe Tyr Asp Pro Leu  Ala Gly Lys Val Leu  Leu Asp Gly
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Glu Asn Ile Ala Tyr Gly Asp Asn Ser Arg Val Val Ser Gln Glu
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Glu Ser Leu Pro Asn Lys Tyr Ser Thr Lys Val Gly Asp Lys Gly
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Thr Gln Leu Ser Gly Gly Gln Lys Gln Arg Ile Ala Ile Ala Arg
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Ala Leu Val Arg Gln Pro His Ile Leu Leu Leu Asp Glu Ala Thr
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Asp Lys Ala Arg Glu Gly Arg Thr Cys Ile Val Ile Ala His Arg
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Leu Ser Thr Ile Gln Asn Ala Asp Leu Ile Val Val Phe Gln Asn
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Gly Arg Val Lys Glu His Gly Thr His Gln Gln Leu Leu Ala Gln
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Arg Gln
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Cys Met Ile Leu Gly Thr Leu Ala Ala Ile Ile His Gly Thr Leu Leu
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Pro Leu Leu Met Leu Val Phe Gly Asn Met Thr Asp Ser Phe Thr Lys
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Ala Glu Ala Ser Ile Leu Pro Ser Ile Thr Asn Gln Ser Gly Pro Asn
85 90 95

Ser Thr Leu Ile Ile Ser Asn Ser Ser Leu Glu Glu Glu Met Ala Ile
100 105 110

Tyr Ala Tyr Tyr Tyr Thr Gly Ile Gly Ala Gly Val Leu Ile Val Ala
115 120 125

Tyr Ile Gln Val Ser Leu Trp Cys Leu Ala Ala Gly Arg Gln Ile His
130 135 140

Lys Ile Arg Gln Lys Phe Phe His Ala Ile Met Asn Gln Glu Ile Gly
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Trp Phe Asp Val His Asp Val Gly Glu Leu Asn Thr Arg Leu Thr Asp
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Asp Val Ser Lys Ile Asn Asp Gly Ile Gly Asp Lys Ile Gly Met Phe
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Phe Gln Ser Ile Thr Thr Phe Leu Ala Gly Phe Ile Ile Gly Phe Ile
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Ser Gly Trp Lys Leu Thr Leu Val Ile Leu Ala Val Ser Pro Leu Ile
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Gly Leu Ser Ser Ala Leu Trp Ala Lys Val Leu Thr Ser Phe Thr Asn
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Lys Glu Leu Gln Ala Tyr Ala Lys Ala Gly Ala Val Ala Glu Glu Val
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Leu Glu Arg Tyr Asn Lys Asn Leu Glu Glu Ala Lys Asn Val Gly Ile
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Lys Lys Ala Ile Thr Ala Ser Ile Ser Ile Gly Ile Ala Tyr Leu Leu
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Val Tyr Ala Ser Tyr Ala Leu Ala Phe Trp Tyr Gly Thr Ser Leu Val
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Leu Ser Asn Glu Tyr Ser Ile Gly Glu Val Leu Thr Val Phe Phe Ser
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Ile Leu Leu Gly Thr Phe Ser Ile Gly His Leu Ala Pro Asn Ile Glu
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Ala Phe Ala Asn Ala Arg Gly Ala Ala Phe Glu Ile Phe Lys Ile Ile
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Asp Asn Glu Pro Ser Ile Asp Ser Phe Ser Thr Lys Gly Tyr Lys Pro
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Asp Ser Ile Met Gly Asn Leu Glu Phe Lys Asn Val His Phe Asn Tyr
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Ser Thr Thr Val Gln Leu Met Gln Arg Leu Tyr Asp Pro Leu Glu Gly
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Val Val Ser Ile Asp Gly Gln Asp Ile Arg Thr Ile Asn Val Arg Tyr
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Glu Gly Arg Thr Thr Ile Val Ile Ala His Arg Leu Ser Thr Val Arg
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Asn Ala Asp Val Ile Ala Gly Phe Asp Gly Gly Val Ile Val Glu Gln
595 600 605

Gly Asn His Asp Glu Leu Met Arg Glu Lys Gly Ile Tyr Phe Lys Leu
610 615 620

Val Met Thr Gln Thr Arg Gly Asn Glu Ile Glu Pro Gly Asn Asn Ala
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Tyr Gly Ser Gln Ser Asp Thr Asp Ala Ser Glu Leu Thr Ser Glu Glu
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Ser Lys Ser Pro Leu Ile Arg Arg Ser Ile Tyr Arg Ser Val His Arg
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Lys Gln Asp Gln Glu Arg Arg Leu Ser Met Lys Glu Ala Val Asp Glu
675 680 685

Asp Val Pro Leu Val Ser Phe Trp Arg Ile Leu Asn Leu Asn Leu Ser
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Glu Trp Pro Tyr Leu Leu Val Gly Val Leu Cys Ala Val Ile Asn Gly
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Cys Ile Gln Pro Val Phe Ala Ile Val Phe Ser Arg Ile Val Gly Val
725 730 735

Phe Ser Arg Asp Asp Asp His Glu Thr Lys Arg Gln Asn Cys Asn Leu
740 745 750

Phe Ser Leu Phe Phe Leu Val Met Gly Leu Ile Ser Phe Val Thr Tyr
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Phe Phe Gln Gly Phe Thr Phe Gly Lys Ala Gly Glu Ile Leu Thr Lys
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Trp Phe Asp Asp His Lys Asn Ser Thr Gly Ser Leu Thr Thr Arg Leu
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Ala Ser Asp Ala Ser Ser Val Lys Gly Ala Met Gly Ala Arg Leu Ala
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Val Val Thr Gln Asn Val Ala Asn Leu Gly Thr Gly Val Ile Leu Ser
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Leu Val Tyr Gly Trp Gln Leu Thr Leu Leu Leu Val Val Ile Ile Pro
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Leu Ile Val Leu Gly Gly Ile Ile Glu Met Lys Leu Leu Ser Gly Gln
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Ala Leu Lys Asp Lys Lys Gln Leu Glu Ile Ser Gly Lys Ile Ala Thr
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Glu Ala Ile Glu Asn Phe Arg Thr Ile Val Ser Leu Thr Arg Glu Gln
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Lys Phe Glu Thr Met Tyr Ala Gln Ser Leu Gln Val Pro Tyr Arg Asn
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Ala Met Met Tyr Phe Ser Tyr Ala Ala Cys Phe Arg Phe Gly Ala Tyr
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Val Ser Val Leu Thr Met Phe Arg Tyr Ala Gly Trp Leu Asp Arg Leu
35 40 45

Tyr Met Leu Val Gly Thr Leu Ala Ala Ile Ile His Gly Val Ala Leu
50 55 60

Pro Leu Met Met Leu Ile Phe Gly Asp Met Thr Asp Ser Phe Ala Ser
65 70 75 80

Val Gly Asn Val Ser Lys Asn Ser Thr Asn Met Ser Glu Ala Asp Lys
85 90 95

Arg Ala Met Phe Ala Lys Leu Glu Glu Glu Met Thr Thr Tyr Ala Tyr
100 105 110

Tyr Tyr Thr Gly Ile Gly Ala Gly Val Leu Ile Val Ala Tyr Ile Gln
115 120 125

Val Ser Phe Trp Cys Leu Ala Ala Gly Arg Gln Ile His Lys Ile Arg
130 135 140

Gln Lys Phe Phe His Ala Ile Met Asn Gln Glu Ile Gly Trp Phe Asp
145 150 155 160

Val His Asp Val Gly Glu Leu Asn Thr Arg Leu Thr Asp Asp Val Ser
165 170 175

Lys Ile Asn Glu Gly Ile Gly Asp Lys Ile Gly Met Phe Phe Gln Ala
180 185 190

Met Ala Thr Phe Phe Gly Gly Phe Ile Ile Gly Phe Thr Arg Gly Trp
195 200 205

Lys Leu Thr Leu Val Ile Leu Ala Ile Ser Pro Val Leu Gly Leu Ser
210 215 220

Ala Gly Ile Trp Ala Lys Ile Leu Ser Ser Phe Thr Asp Lys Glu Leu
225 230 235 240

His Ala Tyr Ala Lys Ala Gly Ala Val Ala Glu Glu Val Leu Ala Ala
245 250 255

Ile Arg Thr Val Ile Ala Phe Gly Gly Gln Lys Lys Glu Leu Glu Arg
260 265 270

Tyr Asn Asn Asn Leu Glu Glu Ala Lys Arg Leu Gly Ile Lys Lys Ala
275 280 285

Ile Thr Ala Asn Ile Ser Met Gly Ala Ala Phe Leu Leu Ile Tyr Ala
290 295 300

Ser Tyr Ala Leu Ala Phe Trp Tyr Gly Thr Ser Leu Val Ile Ser Lys
305 310 315 320

Glu Tyr Ser Ile Gly Gln Val Leu Thr Val Phe Phe Ser Val Leu Ile
325 330 335

Gly Ala Phe Ser Val Gly Gln Ala Ser Pro Asn Ile Glu Ala Phe Ala
340 345 350

Asn Ala Arg Gly Ala Ala Tyr Glu Val Phe Lys Ile Ile Asp Asn Lys
355 360 365

Pro Ser Ile Asp Ser Phe Ser Lys Ser Gly His Lys Pro Asp Asn Ile
370 375 380

Gln Gly Asn Leu Glu Phe Lys Asn Ile His Phe Ser Tyr Pro Ser Arg
385 390 395 400

Lys Glu Val Gln Ile Leu Lys Gly Leu Asn Leu Lys Val Lys Ser Gly
405 410 415

Gln Thr Val Ala Leu Val Gly Asn Ser Gly Cys Gly Lys Ser Thr Thr
420 425 430

Val Gln Leu Met Gln Arg Leu Tyr Asp Pro Leu Asp Gly Met Val Ser
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465 470 475 480

Ala Glu Asn Ile Arg Tyr Gly Arg Glu Asp Val Thr Met Asp Glu Ile
485 490 495

Glu Lys Ala Val Lys Glu Ala Asn Ala Tyr Asp Phe Ile Met Lys Leu
500 505 510

Pro His Gln Phe Asp Thr Leu Val Gly Glu Arg Gly Ala His Val Ser
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Gly Gly Gln Lys Gln Arg Ile Ala Ile Ala Arg Ala Leu Val Arg Asn
530 535 540

Pro Lys Ile Leu Leu Leu Asp Glu Ala Thr Ser Ala Leu Asp Thr Glu
545 550 555 560

Ser Glu Ala Val Val Gln Ala Ala Leu Asp Lys Ala Arg Glu Gly Arg
565 570 575

Thr Thr Ile Val Ile Ala His Arg Leu Ser Thr Val Arg Asn Ala Asp
580 585 590

Val Ile Ala Gly Phe Asp Gly Gly Val Ile Val Glu Gln Gly Asn His
595 600 605

Asp Glu Leu Met Arg Glu Lys Gly Ile Tyr Phe Lys Leu Val Met Thr
610 615 620

Gln Thr Ala Gly Asn Glu Ile Glu Leu Gly Asn Glu Ala Cys Lys Ser
625 630 635 640

Lys Asp Glu Ile Asp Asn Leu Asp Met Ser Ser Lys Asp Ser Gly Ser
645 650 655

Ser Leu Ile Arg Arg Arg Ser Thr Arg Lys Ser Ile Cys Gly Pro His
660 665 670

Asp Gln Asp Arg Lys Leu Ser Thr Lys Glu Ala Leu Asp Glu Asp Val
675 680 685

Pro Pro Ala Ser Phe Trp Arg Ile Leu Lys Leu Asn Ser Thr Glu Trp
690 695 700

Pro Tyr Phe Val Val Gly Ile Phe Cys Ala Ile Ile Asn Gly Gly Leu
705 710 715 720

Gln Pro Ala Phe Ser Val Ile Phe Ser Lys Val Val Gly Val Phe Thr
725 730 735

Asn Gly Gly Pro Pro Glu Thr Gln Arg Gln Asn Ser Asn Leu Phe Ser
740 745 750

Leu Leu Phe Leu Ile Leu Gly Ile Ile Ser Phe Ile Thr Phe Phe Leu
755 760 765

Gln Gly Phe Thr Phe Gly Lys Ala Gly Glu Ile Leu Thr Lys Arg Leu
770 775 780

Arg Tyr Met Val Phe Lys Ser Met Leu Arg Gln Asp Val Ser Trp Phe
785 790 795 800

Asp Asp Pro Lys Asn Thr Thr Gly Ala Leu Thr Thr Arg Leu Ala Asn
805 810 815

Asp Ala Ala Gln Val Lys Gly Ala Thr Gly Ser Arg Leu Ala Val Ile
820 825 830

Phe Gln Asn Ile Ala Asn Leu Gly Thr Gly Ile Ile Ile Ser Leu Ile
835 840 845

Tyr Gly Trp Gln Leu Thr Leu Leu Leu Leu Ala Ile Val Pro Ile Ile
850 855 860

Ala Ile Ala Gly Val Val Glu Met Lys Met Leu Ser Gly Gln Ala Leu
865 870 875 880

Lys Asp Lys Lys Glu Leu Glu Gly Ser Gly Lys Ile Ala Thr Glu Ala
885 890 895

Ile Glu Asn Phe Arg Thr Val Val Ser Leu Thr Arg Glu Gln Lys Phe
900 905 910

Glu Thr Met Tyr Ala Gln Ser Leu Gln Ile Pro Tyr Arg Asn Ala Met
915 920 925

Lys Lys Ala His Val Phe Gly Ile Thr Phe Ser Phe Thr Gln Ala Met
930 935 940

Met Tyr Phe Ser Tyr Ala Ala Cys Phe Arg Phe Gly Ala Tyr Leu Val
945 950 955 960

Thr Gln Gln Leu Met Thr Phe Glu Asn Val Leu Leu Val Phe Ser Ala
965 970 975

Ile Val Phe Gly Ala Met Ala Val Gly Gln Val Ser Ser Phe Ala Pro
980 985 990

Asp Tyr Ala Lys Ala Thr Val Ser Ala Ser His Ile Ile Arg Ile Ile
995 1000 1005

Glu Lys Thr Pro Glu Ile Asp Ser Tyr Ser Thr Gln Gly Leu Lys
1010 1015 1020

Pro Asn Met Leu Glu Gly Asn Val Gln Phe Ser Gly Val Val Phe
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Asn Tyr Pro Thr Arg Pro Ser Ile Pro Val Leu Gln Gly Leu Ser
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Leu Glu Val Lys Lys Gly Gln Thr Leu Ala Leu Val Gly Ser Ser
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Gly Cys Gly Lys Ser Thr Val Val Gln Leu Leu Glu Arg Phe Tyr
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Asp Pro Met Ala Gly Ser Val Phe Leu Asp Gly Lys Glu Ile Lys
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Gln Leu Asn Val Gln Trp Leu Arg Ala Gln Leu Gly Ile Val Ser
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Gln Glu Pro Ile Leu Phe Asp Cys Ser Ile Ala Glu Asn Ile Ala
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Tyr Gly Asp Asn Ser Arg Val Val Ser Tyr Glu Glu Ile Val Arg
1130 1135 1140

Ala Ala Lys Glu Ala Asn Ile His Gln Phe Ile Asp Ser Leu Pro
1145 1150 1155

Asp Lys Tyr Asn Thr Arg Val Gly Asp Lys Gly Thr Gln Leu Ser
1160 1165 1170

Gly Gly Gln Lys Gln Arg Ile Ala Ile Ala Arg Ala Leu Val Arg
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Gln Pro His Ile Leu Leu Leu Asp Glu Ala Thr Ser Ala Leu Asp
1190 1195 1200

Thr Glu Ser Glu Lys Val Val Gln Glu Ala Leu Asp Lys Ala Arg
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Glu Gly Arg Thr Cys Ile Val Ile Ala His Arg Leu Ser Thr Ile
1220 1225 1230

Gln Asn Ala Asp Leu Ile Val Val Ile Gln Asn Gly Lys Val Lys
1235 1240 1245

Glu His Gly Thr His Gln Gln Leu Leu Ala Gln Lys Gly Ile Tyr
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Glu Gly Ala Val Leu Ser Phe His Asn Ile Cys Tyr Arg Val Lys Leu
35 40 45

Lys Ser Gly Phe Leu Pro Cys Arg Lys Pro Val Glu Lys Glu Ile Leu
50 55 60

Ser Asn Ile Asn Gly Ile Met Lys Pro Gly Leu Asn Ala Ile Leu Gly
65 70 75 80

Pro Thr Gly Gly Gly Lys Ser Ser Leu Leu Asp Val Leu Ala Ala Arg
85 90 95

Lys Asp Pro Ser Gly Leu Ser Gly Asp Val Leu Ile Asn Gly Ala Pro
100 105 110

Arg Pro Ala Asn Phe Lys Cys Asn Ser Gly Tyr Val Val Gln Asp Asp
115 120 125

Val Val Met Gly Thr Leu Thr Val Arg Glu Asn Leu Gln Phe Ser Ala
130 135 140

Ala Leu Arg Leu Ala Thr Thr Met Thr Asn His Glu Lys Asn Glu Arg
145 150 155 160

Ile Asn Arg Val Ile Glu Glu Leu Gly Leu Asp Lys Val Ala Asp Ser
165 170 175

Lys Val Gly Thr Gln Phe Ile Arg Gly Val Ser Gly Gly Glu Arg Lys
180 185 190

Arg Thr Ser Ile Gly Met Glu Leu Ile Thr Asp Pro Ser Ile Leu Ser
195 200 205

Leu Asp Glu Pro Thr Thr Gly Leu Asp Ser Ser Thr Ala Asn Ala Val
210 215 220

Leu Leu Leu Leu Lys Arg Met Ser Lys Gln Gly Arg Thr Ile Ile Phe
225 230 235 240

Ser Ile His Gln Pro Arg Tyr Ser Ile Phe Lys Leu Phe Asp Ser Leu
245 250 255

Thr Leu Leu Ala Ser Gly Arg Leu Met Phe His Gly Pro Ala Gln Glu
260 265 270

Ala Leu Gly Tyr Phe Glu Ser Ala Gly Tyr His Cys Glu Ala Tyr Asn
275 280 285

Asn Pro Ala Asp Phe Phe Leu Asp Ile Ile Asn Gly Asp Ser Thr Ala
290 295 300

Val Ala Leu Asn Arg Glu Glu Asp Phe Lys Ala Thr Glu Ile Ile Glu
305 310 315 320

Pro Ser Lys Gln Asp Lys Pro Leu Ile Glu Lys Leu Ala Glu Ile Tyr
325 330 335

Val Asn Ser Ser Phe Tyr Lys Glu Thr Lys Ala Glu Leu His Gln Leu
340 345 350

Ser Gly Gly Glu Lys Lys Lys Lys Ile Thr Val Phe Lys Glu Ile Ser
355 360 365

Tyr Thr Thr Ser Phe Cys His Gln Leu Arg Trp Val Ser Lys Arg Ser
370 375 380

Phe Lys Asn Leu Leu Gly Asn Pro Gln Ala Ser Ile Ala Gln Ile Ile
385 390 395 400

Val Thr Val Val Leu Gly Leu Val Ile Gly Ala Ile Tyr Phe Gly Leu
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Lys Asn Asp Ser Thr Gly Ile Gln Asn Arg Ala Gly Val Leu Phe Phe
420 425 430

Leu Thr Thr Asn Gln Cys Phe Ser Ser Val Ser Ala Val Glu Leu Phe
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Val Val Glu Lys Lys Leu Phe Ile His Glu Tyr Ile Ser Gly Tyr Tyr
450 455 460

Arg Val Ser Ser Tyr Phe Leu Gly Lys Leu Leu Ser Asp Leu Leu Pro
465 470 475 480

Met Arg Met Leu Pro Ser Ile Ile Phe Thr Cys Ile Val Tyr Phe Met
485 490 495

Leu Gly Leu Lys Pro Lys Ala Asp Ala Phe Phe Val Met Met Phe Thr
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Leu Met Met Val Ala Tyr Ser Ala Ser Ser Met Ala Leu Ala Ile Ala
515 520 525

Ala Gly Gln Ser Val Val Ser Val Ala Thr Leu Leu Met Thr Ile Cys
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Phe Val Phe Met Met Ile Phe Ser Gly Leu Leu Val Asn Leu Thr Thr
545 550 555 560

Ile Ala Ser Trp Leu Ser Trp Leu Gln Tyr Phe Ser Ile Pro Arg Tyr
565 570 575

Gly Phe Thr Ala Leu Gln His Asn Glu Phe Leu Gly Gln Asn Phe Cys
580 585 590

Pro Gly Leu Asn Ala Thr Gly Asn Asn Pro Cys Asn Tyr Ala Thr Cys
595 600 605

Thr Gly Glu Glu Tyr Leu Val Lys Gln Gly Ile Asp Leu Ser Pro Trp
610 615 620

Gly Leu Trp Lys Asn His Val Ala Leu Ala Cys Met Ile Val Ile Phe
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Leu Thr Ile Ala Tyr Leu Lys Leu Leu Phe Leu Lys Lys Tyr Ser
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Ile Ala Phe Val Phe Met Met Leu Phe Ser Gly Leu Leu Val Asn Leu
35 40 45

Arg Thr Ile Gly Pro Trp Leu Ser Trp Leu Gln Tyr Phe Ser Ile Pro
50 55 60

Arg Tyr Gly Phe Thr Ala Leu Gln Tyr Asn Glu Phe Leu Gly Gln Glu
65 70 75 80

Phe Cys Pro Gly Phe Asn Val Thr Asp Asn Ser Thr Cys Val Asn Ser
85 90 95

Tyr Ala Ile Cys Thr Gly Asn Glu Tyr Leu Ile Asn Gln Gly Ile Glu
100 105 110

Leu Ser Pro Trp Gly Leu Trp Lys Asn His Val Ala Leu Ala Cys Met
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Ile Ile Ile Phe Leu Thr Ile Ala Tyr Leu Lys Leu Leu Phe Leu Lys
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Lys Tyr Ser
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attcaatgta acggacaaca gcacttgtgt taacagctat gcaatatgta ctggtaacga 1860

gtacttgata aatcagggca tcgaactgtc accttgggga ctgtggaaga atcatgtggc 1920

cctggcttgt atgattatta tcttcctcac aattgcctac ctgaaattgt tgtttcttaa 1980

aaagtattct taatttcccc tttaacggac tattaattgt actcc 2025

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Asn Asn Gly Leu Pro Arg Met Asn Ser Arg Ala Val Arg Thr Leu Ala
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Glu Gly Asp Val Leu Ser Phe His His Ile Thr Tyr Arg Val Lys Val
35 40 45

Lys Ser Gly Phe Leu Val Arg Lys Thr Val Glu Lys Glu Ile Leu Ser
50 55 60

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Asp Ile Asn Gly Ile Met Lys Pro Gly Leu Asn Ala Ile Leu Gly Pro
65                  70                  75                  80

Thr Gly Gly Gly Lys Ser Ser Leu Leu Asp Val Leu Ala Ala Arg Lys
                85                  90                  95

Asp Pro Lys Gly Leu Ser Gly Asp Val Leu Ile Asn Gly Ala Pro Gln
            100                 105                 110

Pro Ala His Phe Lys Cys Cys Ser Gly Tyr Val Val Gln Asp Asp Val
        115                 120                 125

Val Met Gly Thr Leu Thr Val Arg Glu Asn Leu Gln Phe Ser Ala Ala
    130                 135                 140

Leu Arg Leu Pro Thr Thr Met Lys Asn His Glu Lys Asn Glu Arg Ile
145                 150                 155                 160

Asn Thr Ile Ile Lys Glu Leu Gly Leu Glu Lys Val Ala Asp Ser Lys
                165                 170                 175

Val Gly Thr Gln Phe Ile Arg Gly Ile Ser Gly Gly Glu Arg Lys Arg
            180                 185                 190

Thr Ser Ile Gly Met Glu Leu Ile Thr Asp Pro Ser Ile Leu Phe Leu
        195                 200                 205

Asp Glu Pro Thr Thr Gly Leu Asp Ser Ser Thr Ala Asn Ala Val Leu
    210                 215                 220

Leu Leu Leu Lys Arg Met Ser Lys Gln Gly Arg Thr Ile Ile Phe Ser
225                 230                 235                 240

Ile His Gln Pro Arg Tyr Ser Ile Phe Lys Leu Phe Asp Ser Leu Thr
                245                 250                 255

Leu Leu Ala Ser Gly Lys Leu Val Phe His Gly Pro Ala Gln Lys Ala
            260                 265                 270

Leu Glu Tyr Phe Ala Ser Ala Gly Tyr His Cys Glu Pro Tyr Asn Asn
        275                 280                 285

Pro Ala Asp Phe Phe Leu Asp Val Ile Asn Gly Asp Ser Ser Ala Val
    290                 295                 300

Met Leu Asn Arg Glu Glu Gln Asp Asn Glu Ala Asn Lys Thr Glu Glu
305                 310                 315                 320

Pro Ser Lys Gly Glu Lys Pro Val Ile Glu Asn Leu Ser Glu Phe Tyr
                325                 330                 335

Ile Asn Ser Ala Ile Tyr Gly Glu Thr Lys Ala Glu Leu Asp Gln Leu
            340                 345                 350

Pro Gly Ala Gln Glu Lys Lys Gly Thr Ser Ala Phe Lys Glu Pro Val
        355                 360                 365

Tyr Val Thr Ser Phe Cys His Gln Leu Arg Trp Ile Ala Arg Arg Ser
    370                 375                 380

Phe Lys Asn Leu Leu Gly Asn Pro Gln Ala Ser Val Ala Gln Leu Ile
385                 390                 395                 400

Val Thr Val Ile Leu Gly Leu Ile Ile Gly Ala Ile Tyr Phe Asp Leu
                405                 410                 415
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Lys Tyr Asp Ala Ala Gly Met Gln Asn Arg Ala Gly Val Leu Phe Phe
420 425 430

Leu Thr Thr Asn Gln Cys Phe Ser Ser Val Ser Ala Val Glu Leu Phe
435 440 445

Val Val Glu Lys Lys Leu Phe Ile His Glu Tyr Ile Ser Gly Tyr Tyr
450 455 460

Arg Val Ser Ser Tyr Phe Phe Gly Lys Val Met Ser Asp Leu Leu Pro
465 470 475 480

Met Arg Phe Leu Pro Ser Val Ile Phe Thr Cys Ile Leu Tyr Phe Met
485 490 495

Leu Gly Leu Lys Lys Thr Val Asp Ala Phe Phe Ile Met Met Phe Thr
500 505 510

Leu Ile Met Val Ala Tyr Thr Ala Ser Ser Met Ala Leu Ala Ile Ala
515 520 525

Thr Gly Gln Ser Val Val Ser Val Ala Thr Leu Leu Met Thr Ile Ala
530 535 540

Phe Val Phe Met Met Leu Phe Ser Gly Leu Leu Val Asn Leu Arg Thr
545 550 555 560

Ile Gly Pro Trp Leu Ser Trp Leu Gln Tyr Phe Ser Ile Pro Arg Tyr
565 570 575

Gly Phe Thr Ala Leu Gln Tyr Asn Glu Phe Leu Gly Gln Glu Phe Cys
580 585 590

Pro Gly Phe Asn Val Thr Asp Asn Ser Thr Cys Val Asn Ser Tyr Ala
595 600 605

Ile Cys Thr Gly Asn Glu Tyr Leu Ile Asn Gln Gly Ile Glu Leu Ser
610 615 620

Pro Trp Gly Leu Trp Lys Asn His Val Ala Leu Ala Cys Met Ile Ile
625 630 635 640

Ile Phe Leu Thr Ile Ala Tyr Leu Lys Leu Leu Phe Leu Lys Lys Tyr
645 650 655

Ser

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gcacgcatcc tgagatcctg agcctttggt taagaccgag ctctattaag ctgaaaagat 180

aaaaactctc cagatgtctt ccagtaatgt cgaagttttt atcccagtgt cacaaggaaa 240

caccaatggc ttccccgcga cagcttccaa tgacctgaag gcatttactg aaggagctgt 300

gttaagtttt cataacatct gctatcgagt aaaactgaag agtggctttc taccttgtcg 360

aaaaccagtt gagaaagaaa tattatcgaa tatcaatggg atcatgaaac ctggtctcaa 420

cgccatcctg ggacccacag gtggaggcaa atcttcgtta ttagatgtct tagctgcaag 480

gaaagatcca agtggattat ctggagatgt tctgataaat ggagcaccgc gacctgccaa 540

tttcaaatgt aattcaggtt acgtggtaca agatgatgtt gtgatgggca ctctgacggt 600

gagagaaaac ttacagttct cagcagctct tcggcttgca acaactatga cgaatcatga 660

aaaaaacgaa cggattaaca gggtcattca agagttaggt ctggataaag tggcagactc 720

caaggttgga actcagttta tccgtggtgt gtctggagga gaaagaaaaa ggactagtat 780

aggaatggag cttatcactg atccttccat cttgttcttg gatgagccta caactggctt 840

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aacaatcatc ttctccattc atcagcctcg atattccatc ttcaagttgt ttgatagcct 960

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tgtcaactcc tccttctaca aagagacaaa agctgaatta catcaacttt ccgggggtga 1260

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caatctcaca accattgcat cttggctgtc atggcttcag tacttcagca ttccacgata 1920

tggatttacg gctttgcagc ataatgaatt tttgggacaa aacttctgcc caggactcaa 1980

tgcaacagga aacaatcctt gtaactatgc aacatgtact ggcgaagaat atttggtaaa 2040

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Thr Asn Gly Phe Pro Ala Thr Ala Ser Asn Asp Leu Lys Ala Phe Thr
20 25 30

Glu Gly Ala Val Leu Ser Phe His Asn Ile Cys Tyr Arg Val Lys Leu
35 40 45

Lys Ser Gly Phe Leu Pro Cys Arg Lys Pro Val Glu Lys Glu Ile Leu
50 55 60

Ser Asn Ile Asn Gly Ile Met Lys Pro Gly Leu Asn Ala Ile Leu Gly
65 70 75 80

Pro Thr Gly Gly Gly Lys Ser Ser Leu Leu Asp Val Leu Ala Ala Arg
85 90 95

Lys Asp Pro Ser Gly Leu Ser Gly Asp Val Leu Ile Asn Gly Ala Pro
100 105 110

Arg Pro Ala Asn Phe Lys Cys Asn Ser Gly Tyr Val Val Gln Asp Asp
115 120 125

Val Val Met Gly Thr Leu Thr Val Arg Glu Asn Leu Gln Phe Ser Ala
130 135 140

Ala Leu Arg Leu Ala Thr Thr Met Thr Asn His Glu Lys Asn Glu Arg
145 150 155 160

Ile Asn Arg Val Ile Gln Glu Leu Gly Leu Asp Lys Val Ala Asp Ser
165 170 175

Lys Val Gly Thr Gln Phe Ile Arg Gly Val Ser Gly Gly Glu Arg Lys
180 185 190

Arg Thr Ser Ile Gly Met Glu Leu Ile Thr Asp Pro Ser Ile Leu Phe
195 200 205

Leu Asp Glu Pro Thr Thr Gly Leu Asp Ser Ser Thr Ala Asn Ala Val
210 215 220

Leu Leu Leu Leu Lys Arg Met Ser Lys Gln Gly Arg Thr Ile Ile Phe
225 230 235 240

Ser Ile His Gln Pro Arg Tyr Ser Ile Phe Lys Leu Phe Asp Ser Leu
245 250 255

Thr Leu Leu Ala Ser Gly Arg Leu Met Phe His Gly Pro Ala Gln Glu
260 265 270

Ala Leu Gly Tyr Phe Glu Ser Ala Gly Tyr His Cys Glu Ala Tyr Asn
275 280 285

Asn Pro Ala Asp Phe Phe Leu Asp Ile Ile Asn Gly Asp Ser Thr Ala
290 295 300

Val Ala Leu Asn Arg Glu Glu Asp Phe Lys Ala Thr Glu Ile Ile Glu
305 310 315 320

Pro Ser Lys Gln Asp Lys Pro Leu Ile Glu Lys Leu Ala Glu Ile Tyr
325 330 335

Val Asn Ser Ser Phe Tyr Lys Glu Thr Lys Ala Glu Leu His Gln Leu
340 345 350

Ser Gly Gly Glu Lys Lys Lys Lys Ile Thr Val Phe Lys Glu Ile Ser
355 360 365

Tyr Thr Thr Ser Phe Cys His Gln Leu Arg Trp Val Ser Lys Arg Ser
370 375 380

Phe Lys Asn Leu Leu Gly Asn Pro Gln Ala Ser Ile Ala Gln Ile Ile
385 390 395 400

Val Thr Val Val Leu Gly Leu Val Ile Gly Ala Ile Tyr Phe Gly Leu
405 410 415

Lys Asn Asp Ser Thr Gly Ile Gln Asn Arg Ala Gly Val Leu Phe Phe
420 425 430

Leu Thr Thr Asn Gln Cys Phe Ser Ser Val Ser Ala Val Glu Leu Phe
435 440 445

Val Val Glu Lys Lys Leu Phe Ile His Glu Tyr Ile Ser Gly Tyr Tyr
450 455 460

Arg Val Ser Ser Tyr Phe Leu Gly Lys Leu Leu Ser Asp Leu Leu Pro
465 470 475 480

Met Arg Met Leu Pro Ser Ile Ile Phe Thr Cys Ile Val Tyr Phe Met
485 490 495

Leu Gly Leu Lys Ala Lys Ala Asp Ala Phe Phe Val Met Met Phe Thr
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Leu Met Met Val Ala Tyr Ser Ala Ser Ser Met Ala Leu Ala Ile Ala
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Ala Gly Gln Ser Val Val Ser Val Ala Thr Leu Leu Met Thr Ile Cys
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Phe Val Phe Met Met Ile Phe Ser Gly Leu Leu Val Asn Leu Thr Thr
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Ile Ala Ser Trp Leu Ser Trp Leu Gln Tyr Phe Ser Ile Pro Arg Tyr
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Gly Phe Thr Ala Leu Gln His Asn Glu Phe Leu Gly Gln Asn Phe Cys
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Pro Gly Leu Asn Ala Thr Gly Asn Asn Pro Cys Asn Tyr Ala Thr Cys
595 600 605

Thr Gly Glu Glu Tyr Leu Val Lys Gln Gly Ile Asp Leu Ser Pro Trp
610 615 620

Gly Leu Trp Lys Asn His Val Ala Leu Ala Cys Met Ile Val Ile Phe
625 630 635 640

Leu Thr Ile Ala Tyr Leu Lys Leu Leu Phe Leu Lys Lys Tyr Ser
645 650 655